

account originally given by Goodsir, that the essential secreting structure of the breast develops from a matrix tissue at numerous scattered centres, which are the same from which the surrounding fat originates, and that the ducts arise out of the same matrix tissue by direct aggregation of the embryonic cells along predetermined lines. It is shown that in neither genus of Monotremata does the mamma possess a duct-system, it simply being a follicular gland. In the Cetacea these follicles open into a median unbranched simple duct. In the Marsupials and all other animals the ducts are branched, which causes the organ to be racemose. It may be noted that it was during the prosecution of this investigation that Mr. Creighton was led to the correct determination of the nature of the coagulation-appearances found in mucus and other albuminous fluids.

NOTES

We regret to announce the death, at Stuttgart, on the 5th inst., of the celebrated traveller and zoologist, Theodor von Heuglin. He was only fifty-two years of age, having been born in 1824, at Hirschlanden, near Leonberg, in Suabia. Von Heuglin had received a comprehensive education and had well prepared himself for his greater travels, by numerous visits to different European countries and by wide study. In 1850 he made a protracted stay in Egypt in order to study oriental languages, manners, and customs. After some visits to the interior of Arabia as well as the east coast of the Red Sea, he became secretary to Dr. Reitz, the Austrian Consul at Khartoum, and in that capacity visited the Upper Nile districts and Abyssinia. When Dr. Reitz had succumbed to the climate, von Heuglin returned to Khartoum, and succeeded him in the consulate. As consul he visited the White Nile, and eventually returned to Germany in 1856. Here he published his excellent "Travels in North-East Africa" (Gotha: Justus Perthes, 1857), which had been preceded (in 1855) by his "Systematic Review of the Birds of Africa." He again paid a visit to the Red Sea, and in 1860 took the lead of the expedition which was to find Vogel's traces, proceeding from the east; Steudner, Kieselbach, Hansal, Schubert, and Münzinger were members of this expedition, which, although acquiring valuable information about the Gallia districts, failed in its principal object. In 1862 von Heuglin returned to Khartoum with Steudner, and in 1863 made a fresh attempt to trace the course of the White Nile. The results of these travels were published in Petermann's *Mittheilungen* (1860-64). His merits were particularly great in ornithology; his drawings are true to nature, his descriptions exact, detailed, and extremely attractive. Also in Arctic regions von Heuglin gave proof of great intelligence and courage; he was almost more successful as an Arctic explorer in 1870 and 1871 than as an African traveller. His work on northern landscapes and animals (published by Westermann, at Brunswick) is one of the most attractive and handsomest records of travels yet published, and is highly esteemed by all who are interested in Arctic exploits. His death was a sadly unexpected one, a slight cough developed into inflammation of the lungs, to which he succumbed in the course of a few days.

We deeply regret that we have to record the death of Mr. T. Heathcote G. Wyndham. Few among the younger men devoting their life to the pursuit of scientific knowledge and to the teaching of science have formed for themselves a higher ideal of the training a man of science should impose on himself before venturing on original work, or on giving instruction to others. As a commoner of Oriel he took a first class in natural science in 1866, was Burdett-Coutts Scholar in 1867, and was afterwards elected Fellow of Merton. He undertook at Merton the duty of a lecturer in natural science, and the thoughtful care he took in his teaching was not only gratefully spoken of by many of the undergraduates, but frequently referred to in conversation by

those who knew him. The branch of natural science which seemed gradually to have presented itself more prominently to his mind for his own especial study was the chemical side of mineralogy. But although for years he fitted himself for this work in all ways he thought requisite, sparing no pains in acquiring collateral knowledge that might bear on his subject, and though he had done original research which many other men would from time to time have thrown off in isolated papers, he held back from appearing in print. A paper on Idocrase and Garnet and one on Vesuvius are, so far as we know, all he published. But there is a prospect that some of his work will be preserved, as in conjunction with Mr. Gurney he had in hand a small work on chemical mineralogy. Although he had not yet achieved work to make his name marked in the world of science, yet those who knew him lament the loss of a scholar and a gentleman, and the lament is in no way softened by the unhappy circumstances attending his death.

THE published results of the exploration of Lake Titicaca by Messrs. Alexander Agassiz and S. W. Garman, has just reached us. The expedition was undertaken during the early months of last year. Mr. Agassiz writes on the hydrography of the lake, describing the peculiarly uniform temperature at all depths, the potability of the water, the scarcity of the fish—six species only—and its previous greater extent. Mr. J. A. Allen gives a list of the mammals and birds collected, with field-notes by Mr. Garman. Of mammals only ten species were obtained, none new, four being Llamas. Of birds sixty-nine species were collected, including a new *Falcinellus (ridgwayi)*, and a Gallinule (*Gallinula garmani*) closely resembling *G. gallinata*. It is noted that many of the species had been but a short time before obtained by Messrs. Bartlett, Whitley, Hauxwell, and Jelski, and described by Messrs. Sclater and Salvini, Cabanis and others. Mr. W. Faxon describes the Crustacea, all excepting a species of *Cypris*, belonging to one amphipodous genus *Allorchestes*, of which seven new fresh-water species are added to the one or two already known. Mr. Agassiz gives a valuable hydrographical map of the lake, and records the presence of corals closely allied to genera living in the West Indies at the height of 2,900 feet above the level of the sea.

MESSRS. CHURCHILL have just published a third edition of Mr. Sutton's "Systematic Handbook of Volumetric Analysis," in which the author has embodied "all such novelties and modifications as experiment have proved to be worthy of notice."

WE have to announce with great regret the death of another martyr to science. In a letter, dated September 15, the Rev. S. McFarlane writes from Somerset, Cape York: "We have just heard of the massacre of Dr. James and his partner, a Swede, at Yule Island by the natives of New Guinea. They had gone in their large boat to the east side of Hall Sound to shoot birds of Paradise, when they were attacked by three canoes, and both white men were killed. The native crew managed to get away in the boat, and brought the sad news here." Dr. James was a young American who had been collecting objects of natural history in Yule Island and on the opposite shores of New Guinea. His first collections arrived in this country about a fortnight ago, having been sent over by his friend, Dr. Alfred Roberts, of Sydney, to whose liberality the expedition was greatly indebted. The excellent way in which the specimens are preserved and the careful notes given by the collector show that Dr. James was enthusiastic in his work, and it is melancholy to think that so promising a scientific career has been thus prematurely cut short. A description of the collection of birds formed by the late traveller will be given by Mr. Bowdler Sharpe at an early meeting of the Linnean Society, in continuation of the articles on the

avifauna of New Guinea, commenced during the last session of the Society.

THE Forty-seventh Session of the Royal Geographical Society was opened on Monday evening by the delivery of the presidential address by Sir Rutherford Alcock. He referred to the satisfactory state of the Society, which now numbers 3,199 members, and to the valuable work it had done since its foundation for the cause of geographical research. He also referred with complete satisfaction to the work accomplished by the Arctic expedition, the leaders of which had done the only thing that could have been done under the circumstances. Sir Rutherford then spoke of the work of Cameron in Africa, the *Challenger* Expedition, Russian Exploration, the Oriental Congress, and on various other topics. He referred to the fact that geography and exploration have now assumed a much more scientific aspect than ever they had before; no traveller can gain distinction by mere topographical detail and descriptive power; his exploration must be conducted on a thoroughly scientific basis. To spread a knowledge of this aspect of geography, lectures are to be given during the winter by General Strachey on the general subject of "Geography in its Scientific Aspect," Dr. Carpenter on "The Physical Geography of the Ocean," and Mr. Wallace on "The Influence of Geographical Conditions on the Comparative Antiquity of Continents, as indicated by the Distribution of Living and Extinct Animals." After the President's address, Sir R. Douglas Forsyth read a paper on "The Buried Cities of the Gobi Desert."

THE Lords of the Admiralty have addressed a letter to the Commander-in-Chief at Portsmouth, in which they request Admiral Elliott to express to Capt. Nares their lordships' warm approval of the conduct of all engaged in the Arctic Expedition. While they deeply commiserate the sufferings of the officers and men, and deplore the loss of life, they cannot but feel that their bearing and conduct have been in all respects worthy of British seamen. Their lordships approve the sound judgment displayed by Capt. Nares in at once, on the return of his sledge parties, determining to endeavour to extricate the ships and return to England, and they observe that his skill and energy in carrying out this determination, ably seconded as he was by Capt. Stephenson, were of the highest order. Capt. Nares proudly records that to uphold British honour and Christian duty to the death was the pre-eminent determination of all under his command.

A SPECIAL Arctic meeting will be held under the auspices of the Royal Geographical Society at St. James's Hall on December 12, when papers on the various results of the English Arctic Expedition will be read by Captains Nares, Markham, and Feilden.

AMERICAN observatories have been very diligent in the search for the supposed "Intra-Mercurial Planet," no less than nine having given their whole time to the search on October 2, 3, 10, and 11, viz., those of Dartmouth College, Harvard College, Cincinnati, Glasgow (Mo.), Washington, Albany, the Coast Survey in San Francisco, Ann Arbor, and the Observatory of Dr. Peters, besides others that have made no report. It is exceedingly creditable to the United States that they contain so many observatories, many of them national ones, in which astronomical observations are so diligently pursued.

THE Free Spanish University we referred to in vol. xiv. p. 132, has been opened in Madrid, under the name of Free Institution of Education, for Government will not allow the assumption of the title University. Only 1,000 guineas have been subscribed, many of the shareholders being well-known Englishmen, among them Prof. Tyndall. The Institution is held at present in one storey of a large house, and has already seventy-three students, besides eight or nine ladies; the fees are very low.

We hope this attempt to establish a university where unrestricted instruction can be given, will prosper, and that the professors, all men of high standing, will soon be able to have a building of their own.

THE library of the late Adolphe Brongniart is to be sold by auction in Paris on December 4, and following days. The classified catalogue, arranged by M. Deyrolle, occupies 240 pp. Svo. Copies may be obtained through M. Deyrolle, 23, Rue de la Monnaie.

THE *Kölnische Zeitung* of November 9 reports on a meeting of the Rhenish section of the German and Austrian Alpenverein, held at Cologne on November 4. It appears that the Verein, the head-quarters of which are at Frankfurt-on-the-Main, consists of sixty sections and numbers over 6,000 members. During 1875 over 2,000l. were expended for the construction of huts and roads in the Alps, and the Verein now owns about twenty-four houses in different parts of the mountains; it has also appointed a special commission for the supervision of guides and huts. Altogether the Verein is thriving, and we may look for important scientific results from its labours.

IT is stated that M. Gessi has discovered a large branch of the Nile, 200 yards wide, with a good current, diverging from the White Nile, 100 miles south of Duffie. It is stated by the natives that it runs in an unobstructed stream into the Nile again, and, if so, water communication may possibly be established between Lake Albert Nyanza and Khartoum. Col. Gordon has discovered a large lake fifty miles in length between Urondogam and Mrooli, a little north of Victoria Nyanza (in 1° N. lat.), from which issues the main branch of the Nile, called Victoria Nile, running from the Victoria to the Albert Lake, together with a branch river which must either join the Sobat river or the Asua river.

THE Italian geographical journal, *Cosmos*, for October contains a continuation of the papers on New Guinea, which it has made a specialty. The present contribution consists of further letters from Dr. Beccari and extracts from the *Challenger* reports.

TO the November number of Petermann's *Mittheilungen*, Lieut. Weyprecht contributes No. 7 of his "Bilder aus dem hohen Norden," under the title of "The Walrus-Hunter." He describes in a graphic and interesting manner the yearly quest of the walrus-fishers in the Spitzbergen Seas, which is becoming more and more difficult and dangerous on account of the increasing scarcity of the animal.

THE Geographical Society of Paris has received news from the Brazza-Marche expedition, now exploring the Ogove, the large stream which falls into the South Atlantic in the French African settlement of Gaboon. It was discovered by the explorers that, after running north to the first degree of S. lat., the Ogoive turns abruptly southwards into quite unexplored regions. MM. Brazza and Marche had lost almost all their goods destined to conciliate the African tribes and to pay for their labour. But the Society sent to them a large number of small objects which will enable them to proceed towards the sources of the river. It is supposed that, owing to the immense volume of its water, it is an outlet for some of the large lakes of the yet untrodden region.

A TELEGRAM from Calcutta states that the district of Backergunge was ravaged by a cyclone on the 1st inst. Thousands of native houses were destroyed. The town of Dowlutkhan was submerged by a storm-wave, which swept away all the buildings of the place. Five thousand persons are believed to have perished. Backergunge is a British district in the Bengal presidency, near the mouth of the Ganges, lying between lat. 22° 2'—23° 13', long. 89° 49'—91°, and has an area of about 3,794

square miles. A severe cyclone has also been experienced at Chittagong.

THE *Kölnische Zeitung* of November 11 reports on a disastrous gale and snowstorm which raged with terrific force in the neighbourhood of Stockholm on the 5th inst. Over fifty vessels stranded near Kalmar, and all railway lines to the south and to Norway were completely snowed up, and traffic upon them interrupted. The latter had not yet been resumed on the 8th inst.

A MAGNIFICENT bolide was observed on Sunday night, November 5, at nine o'clock, at Clerey (Aube), in France. Numerous sparks were visible and an explosion was heard, although very feeble, owing to the immense distance at which it had taken place.

THE French Minister of the Interior has authorised the Municipal Council of Lyons to dedicate a bust to Ampère, the inventor of electro-magnets. This memorial will be placed in the museum where are gathered the memorials of the illustrious men who were born in the city.

THE transit-room in which the Bischofsheim instrument is to be placed is being fitted up at the Paris Observatory. The work is almost finished. M. Leverrier has asked the Minister of Public Instruction to appoint an administrative commission in order to better regulate the part which the Observatory is to take in the 1878 Exhibition.

THE new number of the *Ibis*, now in the press, will conclude the third series and the eighteenth volume of this ornithological periodical, which has been carried on by the British Ornithologists' Union with the greatest energy since its institution as the organ of that body in 1859. A fourth series, under the joint editorship of Messrs. Salvin and Sclater, will be commenced next year.

COUNT T. SALVADORI, of the Royal Zoological Museum of Turin, is engaged on a general account of the birds of the Papuan and Molluccan Islands, based principally on the large collections recently formed by the Italian naturalists Beccari and D'Albertis in those countries. The work will be published, when completed, in the *Annals* of the Museo Civico di Storia Naturale of Genoa, to which institution the above-named collections have been transmitted.

ON Thursday and Friday last week the Haggerstone Entomological Society held its annual exhibition at its place of meeting, No. 10, Brownlow Street, Dalston. It was only in 1857 that a few working men interested in insect-collecting discussed, in West Wickham Wood, the desirability of an east-end club for mutual assistance. A club was formed and now numbers a hundred members. The subscription is but a penny a-week, but with this a reference library has been accumulated. The type cabinet for the collections consists of forty drawers, in which there are now some 15,000 specimens, and the library and collection together are insured for 200*l.* All through the year the society meets every Thursday, and many points of practical importance (some of them bearing on "the theory of evolution," put to the test by breeding) have been discussed. Among the ways in which members of the society have done valuable work may be mentioned the preservation of the avenue of elms in Victoria Park from insect ravages by a knowledge of exactly how to proceed in dealing with the foe. Although this and several such societies do not obtrude themselves on the scientific world, they still, besides exercising a good effect on the members, often do work of sterling value.

WE understand that it is proposed at University College to give a larger development than before to the practical work of students in connection with the classes of mathematics, physics,

and engineering in their workroom especially adapted to the purpose, and placed under the direction of a special teacher, M. Paul Robin. Various models to illustrate the theorems of modern and higher geometry, of kinematics and mechanics, so difficult to understand theoretically,—such models as are so largely represented in the South Kensington Exhibition collection—will be made in a simple manner by the students themselves, side by side with their theoretical studies. The best models, and such as require more time and accuracy for their construction, will be preserved in a small educational collection. It would hardly be possible to insist too strongly on the usefulness, or rather on the absolute necessity of such work for the successful study of science. It is only when the student has not only seen and handled various practical illustrations and applications of the theorems of geometry and mechanics he is studying, but when he has himself constructed them—however roughly approximate they may be—that the mathematical truths will be permanently impressed on his mind. Only thus can he become so familiar with them, that they will be a basis for acquiring further notions, and a source of further mental activity. We wish, therefore, complete success to this new enterprise of University College.

SHORTLY after the appearance of Prof. Tyndall's work on Glaciers, the Bologna Professor, Bianconi, observed that, while Tyndall's experiments certainly prove that rapid changes of form in ice are due to crushing and to regelation, they do not prove at all that ice is devoid of a small degree of plasticity, which degree might be sufficient to explain the plasticity of glaciers. He undertook, therefore, a series of experiments (described and published in 1871 in the *Mem.* of the Acad. of Bologna, 3rd ser. vol. i.) on planks and bars of ice submitted to bending and torsion. The bending of ice-planks having been afterwards the subject of researches of Messrs. Mathews, Moseley, Tyndall, and Heim, it will suffice to say that Prof. Bianconi, making his experiments at higher temperatures (from + 1° to + 5° Cels.), observed a still greater plasticity of the ice than that obtained by the experiments made in England and Germany at lower temperatures. These experiments proved that slow changes of form of the ice may go on without any crushing and regelation, and that ice enjoys a certain degree of plasticity notwithstanding its brittleness; the ice-plank can, indeed, be shattered to pieces, during its bending, by the slightest shock. Now, Prof. Bianconi gives in the *Journal de Physique* for October the results of his further experiments on ice, much like those of Heim, or, yet more, those of M. Tresca on the puncheoning of metals. Granite pebbles and iron plates are slowly pressed into ice at the same temperatures, and not only do they penetrate into it as they would penetrate into a fluid or semi-fluid, but also the particles of ice are laterally repulsed from beneath the intruding body, and form around it a rising fringe. Moreover, when a flat piece of iron is pressed into the ice, the fringe rising around it expands laterally upon the borders of the piece, and tends thus, as in fluids, to fill up the cavity made by the body driven in. These experiments tend thus greatly to illustrate the plasticity of ice; but it would be very desirable that M. Bianconi, if he continues his researches, should accompany them by some measurements (as has already been done by M. Heim) in order to obtain numerical values of the plasticity of ice under various circumstances.

AT the Warsaw meeting of Russian naturalists Prof. Mendeleeff described the results of researches he has pursued during 1875 and 1876 for the verification of Mariotte's law. His former researches had proved that the decrease of volume of the permanent gases proceeds at a slower rate than the increase of pressure exerted on them, if the pressure is less or much greater than the mean pressure of the atmosphere. The experiments of Regnault, made with air, nitrogen, &c., at pressures higher than

that of the atmosphere proved, however, directly the contrary, and a series of measurements undertaken some years ago by Prof. Mendeléeff to verify those of Regnault, gave the same results. Suspecting that there might be some cause of error affecting in the same way both series of experiments, Prof. Mendeléeff and M. Bogusky constructed special apparatus eliminating all possible causes of errors and allowing the most perfect accuracy of measurements. With these they made a new series of researches, at pressures varying from 700 to 2,200 millimetres. These researches confirmed again the conclusions of Regnault, showing only numerical differences in the values obtained, and proving, for instance for the air, that its deviations from Mariotte's law are even less than appeared before. But the most important result of the researches is that the divergences from Mariotte's law shown by the air being negative at pressures above the mean atmosphere, as was observed by Regnault, proved to be positive (decrease of volume slower than the increase of pressure) at pressures below it. We must then conclude that the air experiences a change of compressibility at a certain pressure about the mean of that of the atmosphere; and this conclusion is supported by the circumstance that such a change was noticed also in the carbonic and sulphurous acid gases, but at pressures far lower than is the case for air. Only for hydrogen the divergence is of the positive kind at all pressures. Altogether we must conclude that the deviations from Mariotte's law are far more complicated than has been suspected.

AT the same meeting Prof. Czebovicz demonstrated the influence exercised by various sources of electricity on certain spectra, chlorine, oxide of carbon, &c. The inductive apparatus of Ruhmkorf gives a spectrum differing from that produced by the Holtz electric machine, not only by the number of rays, but also by their position and aspects. Prof. Czebovicz proposes therefore to make for comparative researches a selection of such rays as maintain the same aspect and occupy the same position whatever source of electricity be used; such lines will not be numerous.

AT the same meeting Prof. Grewingk presented the drawing of his geological map of the Baltic provinces, prepared for a second edition. It embodies the results of all acquisitions made in this department during the last fifteen years, and will soon be published.

THE Warsaw Zoological Museum having received during recent years valuable additions from America, Africa, and Eastern Siberia, presented by Count Branicky, is now very rich in the department of higher animals. It counts 514 species of mammalians, 3,216 of birds, and 400 of reptiles and amphibians.

THE Natural Science Club at Cambridge held several successful meetings during the two months' residence in the Long Vacation. The following papers were read:—"Haeckel's Gastraea Theory," by Mr. Marshall (St. John's); "Fermentation," by Mr. Stodart (St. Peter's); "Some Salts of Chromium," by Mr. Houghton (St. John's); "The Relation between the Fore and Hind Limbs of Vertebrates," by Mr. Phillips (St. John's); "Growth," by Mr. Buxton (Trinity); "Theories of Heredity," by Mr. Sedgwick (Trinity); "Owen's Vertebrate Theory of the Skull," by Mr. Humphry (Trinity); many of which were followed by interesting discussions and remarks.

A GERMAN paper describes a dreadful fight between two Polar bears, male and female, in the Cologne Zoological Gardens. After a fierce struggle the female became exhausted, and was dragged by the male into the water basin in the den, and held down till life was quite extinct. He then pulled her out and dragged the body for a considerable time round the den.

FROM a correspondence in the *Times* we learn that the statue of Faraday, subscribed for years ago, and entrusted to Foley to execute, was left by that sculptor in the clay at his death. Since then, Mr. Burch, the principal pupil of Foley, has been entrusted with the founding and completion of the work.

THE second edition of Brehm's well-known "Thierleben" is about to be published in 100 parts, with entirely revised text and with almost entirely new illustrations taken from life.

AT the meeting of the Mathematical Society, on November 9, the changes were made which we intimated in vol. xiv. p. 581-

PART 5 of the second series of the great work, in quarto, upon the butterflies of America, with coloured drawings and descriptions, has just been published by Mr. Edwards, through Hurd and Houghton, New York, and sustains the reputation of its predecessors by the artistic elegance and superiority of its illustrations. These consist of five plates, executed by Miss Peart in her best style, giving, for the most part, not only the different sexes and varieties of the adult insects, but likewise the eggs, larvae, and chrysalides, and the favourite plants upon which they feed. No new species are represented, although several of those included are of great rarity.

THE *City Press* states that some of the Livery Companies have a scheme in embryo for combining to form a College of Technical Instruction in a building to be erected on the Thames Embankment.

THE Board for superintending non-collegiate students give notice that an examination in physical science for the award of an exhibition of 50*l.* a year, granted by the Worshipful Company of Clothworkers, and tenable for three years by a non-collegiate student, will be held in the Censor's rooms, 31, Trumpington Street, Cambridge, commencing on Thursday morning, December 14, 1876, at 9 o'clock. Fuller information as to the subjects of examination and the conditions of tenure of the exhibition may be obtained from the Censor, Rev. R. B. Somerset, Cambridge.

A CAUCASIAN Society of Naturalists has been recently opened at Tiflis.

THE publishing house of Trübner in Strasburg are issuing translations of Macmillan's Science Primers, under the superintendence of the Professors of the University. There have already appeared Roscoe's Chemistry and Balfour Stewart's Physics, the former by Prof. Rose, and the latter by Prof. Warburg, Lockyer's Astronomy, by Prof. Winnecke, and Geikie's Physical Geography, by Prof. Oscar Schmidt, are in the press.

THE *Augsburger Allgemeine Zeitung* of November 5 gives some interesting details of the North-Dutch canal, which was opened officially by the King of Holland on the 1st inst., and which connects the city of Amsterdam directly with the German Ocean. It appears that the canal is 25 kilometres in length, that at its broadest part it measures 120 metres across its surface by 68 metres at its narrowest part. In the middle the depth averages 6 metres, but during the next two years the depth is to be made uniform all over the area of the canal, and to be increased to 8·20 metres, so that even the largest vessels can come close to the quays on both sides of the canal. Its name is to be Ymuiden, viz., mouth of the Y; at the spot where it reaches the sea two enormous moles or dykes have been constructed, reaching 1,600 metres into the sea, and forming a spacious port of refuge for ships during stormy weather; their extreme ends are no less than 1,200 metres apart. The total cost of the canal, which was borne by the Dutch Government as well as by the city of Amsterdam, amounted to more than twenty-six millions of florins, and it is expected that about seventeen millions more will be wanted for the construction of quays, warehouses, &c.; yet the

undertaking cannot fail to be a success, owing to its incalculable importance with reference to the commerce of Amsterdam.

THE following experiment has recently been employed by M. Merget to demonstrate the phenomena of gas-synthesis in plants : Two glass cylindrical vessels of 300 cc. capacity are placed with their open ends in a large vessel of water. The one is filled with hydrogen, the other with oxygen, their interiors are brought into communication by means of a branch which is long enough to reach from one end to the other. The level of the water is seen gradually to rise in each cylinder, and both gases finally disappear, without, however (as other experiments show), condensation or displacement being produced. At the beginning of the experiment there is nearly equality in the volumes which disappear, since a part of the oxygen serves to form carbonic acid ; but, in proportion as the water level rises in the two cylinders, and the projecting parts of the branch become shorter, the disappearing volume of hydrogen becomes more and more nearly double that of the oxygen. If a similar experiment be made with hydrogen and nitrogen in the two vessels, the disappearing volume of the gas is to that of the latter as three to one. Operating with hydrogen and carbonic oxide, both gases always disappear, but in very variable proportions. The most common was one volume hydrogen to one volume carbonic oxide, but the ratios of 4 : 1 and 5 : 1 were also sometimes met with. M. Merget finds in these variations the indication of a formation of hydrates of carbon, and of various carburets of hydrogen.

IT is pretty generally supposed that crystallised nitroglycerine is considerably more sensitive to shocks and blows than the liquid substance, though there is nowhere evidence of this ; and not only is practical experience against it, but from the theoretical standpoint it seems very improbable, for by reason of the positive melting heat of crystallised nitroglycerine, a considerable amount of heat must be employed to change its aggregate state before an explosion can occur. For decision of this question M. Beckerhinn (of the Vienna Academy) recently used a fall-machine furnished with a block of wrought iron 2:130 kilogrammes in weight, having at its lower end a hardened steel point of 7:068 sq. mm. A flat anvil of Bessemer steel was employed as support for the nitroglycerine, which was placed on it in a thin layer, and the weight dropped upon it from different heights. It was found that the mean height of fall with which explosion of the liquid occurred was 0:78 metres, whereas the frozen nitroglycerine did not explode till a fall-height of 2:13 m. was reached, showing that the frozen substance is considerably less sensitive to impact. M. Beckerhinn has determined some constants of the solid material. The average melting heat (from three experiments) appeared to be 33:54 heat-units. The density was found = 1:735 (the determinations were made at a temperature of + 10° C., which is near the melting-point of nitroglycerine) ; that of the liquid material was 1:599, whence it appears that in crystallising of nitroglycerine there is a contraction of about $\frac{1}{12}$ of the original volume.

AMONG the various works presented at the last Congress of Orientalists we notice a very useful catalogue, "Bibliographia Caucasica and Transcaucasica," by M. Miansaroff, the first volume of which recently appeared in St. Petersburg. It is the result of fifteen years' labour by the author and of careful research pursued by him in the chief libraries of Russia, Germany, Italy, and Turkey. The work is divided into three parts, devoted respectively to the Earth, to Man, and to the Mutual Influences of Nature and Man. The first two form the first volume (800 pages in 4to), which contains more than 5,000 titles of books and smaller papers on the Caucasus and Transcaucasus which have appeared in Europe and Asia since A.D. 1565. They are systematically arranged under the heads of geodesy, cartography, physical

geography and geographical descriptions of localities, geology, botany and zoology, mineral springs, climate, medicine, &c. Whatever be the imperfections of this work, or of the classification adopted in it, it will nevertheless prove most useful for all engaged in the study of Caucasus.

DR. KING's report of the Royal Botanical Gardens, Calcutta, for the year 1875-76 has just reached us. In the acclimatisation of valuable economic plants in India, the Calcutta reports have become of late years the official record, and the present report by no means lacks interest on this score, though it is unsatisfactory to find that Dr. King's opinion is still against the possibility of either india-rubber or vanilla becoming staple products of Bengal. With regard to rubber plants both of the Para and Madagascar kinds, he says that during the year it has become more apparent than ever, that neither of these valuable plants can be grown for commercial purposes in the climate of Bengal. In the gardens as well as in the warm tropical valleys of the Sikkim Himalayas both kinds failed. Dr. King suggests that a suitable home may be found for them further north than Tenasserim, Ceylon, or perhaps Malabar. Vanilla, of which a number of plants were put out in the garden under shading similar to that used for protecting the pepper plants, has not made satisfactory growth, which it is suggested may have been due to over-shading, and a further experiment has been made by planting many of them under the shade of mango trees. The finest old vanilla plants in the garden are described as growing against a north wall ; this year one of these plants was laden with pods, but an unusually high temperature caused these to drop prematurely. A better report is given of the ipecacuanha ; numbers of plants have been sent from Calcutta to Ceylon, to the Neilgherries and to Burmah, and the quality of those grown in India is said to be equal to the best native Brazilian growth. A good deal of attention has been directed lately to the bamboo as a source of paper-making material, and it has been thought that it might be cultivated with profit in India for this special purpose, the young tender shoots being reduced to a rough kind of paper-stock for convenience for transmission to England. Dr. King points out that if the old stem would answer the purpose there is plenty of material in India, and a large revenue would accrue, but the young shoots are only produced at a certain season ; nevertheless, experiments are being made with a view to utilise the bamboo for this purpose. In the distribution of plants and seeds, we learn that no less than 23,106 plants, and 6,343 parcels of seeds, were sent out during the year. It is satisfactory to know that amongst Dr. King's other multitudinous duties he has found time to prepare a "Manual of Cinchona Cultivation," and to edit other works on Indian botany. We also learn that Mr. Kurz's "Forest Flora of Burmah" is passing through the press.

PART 3 of vol. i. of the *Proceedings* of the West London Scientific Association has been published, and contains several interesting papers and accounts of excursions.

THE October part of the *Journal* of the Franklin Institute contains an interesting history of the steam-engine in America.

MESSRS. WILLIAMS AND NORRAGE send us the following German scientific works :—“Bilder aus Aquarium,” by Dr. Hess, of Hanover ; and “Grundriss der Zoologie,” by Dr. Gustav von Hayek.

THE additions to the Zoological Society's Gardens during the past week include two Esquimaux dogs (*Canis familiaris*) from the Arctic region, presented by Capt. Allen Young, S.S. *Pandora* ; four Viscachas (*Lagostomus trichodactylus*) from Buenos Ayres, presented by Mr. C. F. Woodgate ; two Banded Ichneumons (*Herpestes fasciatus*) from West Africa, presented by Mr. W. N. Bakewell ; three Chirping Squirrels (*Tamias striatus*)

from North America, presented by Mr. F. W. Stockwell; a Peregrine Falcon (*Falco peregrinus*), European, presented by Mr. Chilton Newburn; a Green Monkey (*Cercopithecus callithrix*) from West Africa, presented by Miss Ridsdall; three American Red Foxes (*Canis fulvus*), a Golden Eagle (*Aquila chrysaetos*) from North America, six Clapperton's Francolins (*Francolinus clappertoni*) from West Africa, deposited.

SOCIETIES AND ACADEMIES

LONDON

Chemical Society, Nov. 2.—Prof. Abel, F.R.S., president, in the chair.—The President announced that the Goldsmith's Company had contributed 1,000/- to the recently-instituted research fund of the Society.—Mr. Lupton then read a paper on the oxides of potassium, after which communications were read on certain bismuth compounds (Part III.), by M. M. P. Muir.—On phospho- and arseno-cyanogen, by W. R. Hodgkinson.—A secondary oxidised product found during the reduction of stannic ethide to stannous ethide, by W. R. Hodgkinson and G. C. Matthews; and a preliminary notice on pigmentum nigrum, the black colouring matter contained in hair and feathers, by W. R. Hodgkinson and H. C. Sorby. This black colouring matter is left on digesting the coloured hair or feathers with dilute sulphuric acid, but is present only in very small quantity.

Zoological Society, November 7.—Prof. Newton, F.R.S., V.P., in the chair.—The Secretary read a report on the addictions that had been made to the Society's Menagerie during the months of June, July, August, and September, 1876.—A letter was read from Dr. Otto Finsch, relating to the supposed existence of the Wild Camel (*Camelus bactrianus*) in Central Asia.—A letter was read from Mr. E. Pierson Ramsay, giving a description of the habits of some *Ceratodi* living in the Australian Museum, Sydney, which he had lately received from Queensland.—Mr. W. K. Parker read a memoir on the structure and development of the skull in the sharks and rays.—Prof. A. Newton made a correction of some of the statements in Canon Tristram's "Note on the Discovery of the Roebuck in Palestine." (F.Z.S., 1876, p. 421).—Lieutenant-Colonel Beddoe gave the description of a new species of Indian Snake from Manantawaddy, in the Wynaad Hills, which he proposed to name *Platyplectrurus hewsoni*.—Dr. G. E. Dobson, communicated a monograph of the Bats of the group *Molossi*.—Dr. A. Gunther, F.R.S., read a report on some of the recent additions to the collection of mammalia in the British Museum, amongst the more remarkable of which was a new form of Porcupine, from Borneo, proposed to be called *Trichys lipura*, and a new Marmozet, obtained by Mr. T. K. Salmon, near Medellin, U.S. of Columbia, to which the name *Hapale leucopus* was given.

Royal Microscopical Society, Nov. 1.—H. C. Sorby, F.R.S., president, in the chair.—A paper by Dr. G. W. Royston Pigott on a new refractometer was read by the President and illustrated by drawings and by the instrument removed for the occasion from the Loan Collection at South Kensington.—A paper by the Rev. W. H. Dollinger, on experiments with sterile putrescible fluids exposed alternately to an optically pure atmosphere and to one charged with known organic germs, was read by the Secretary.—A paper by Mr. F. H. Wenham, on the measurement of the angle of aperture in object glasses, was read by Mr. Ingpen.

PARIS

Academy of Sciences, November 6.—Vice-Admiral Paris in the chair.—The following papers were read:—On an experiment which should be made with a view to the destruction of phylloxera, by M. Em. Blanchard. He advises a general adoption of the method of coating the vines and stakes in winter with coal tar, so as to destroy the eggs lodged in the fissures or under the bark.—Reply to M. Balbiani with regard to migration and egg-laying of phylloxera, by M. Lichtenstein. It is the nutrient and not the interior conformation of the insect that produces the fecundity. M. Lichtenstein does not accept the theory of degenerescence or exhaustion of the females.—Letter to M. Dumas on the products of the winter egg of *Phylloxera vastatrix*, by M. Boiteau.—M. Mouillefert presented some photographs showing the efficacy of treating phylloxerised vines with sulphocarbonate of potassium.—On the efficacy of iodides against saturnine intoxication, by M. Faure. He considers that a work-

man taking 5 to 10 centigrammes of iodide of iron or of potassium daily will have satisfactory results, and not be forced to interrupt his work.—On the results obtained by illumination of photographers' studios with violet light, by M. Scattellari. Violet light acts more rapidly than white or blue, and so requires shorter exposure. Some persons are very impressionable to ordinary light, but not to violet rays. The photographs got with violet rays are better modelled, and have a better finish.—M. Farret communicated results he has obtained in organisation of exercises for remedying Daltonism. These have been established in several schools, and he hopes to introduce them into the army and navy, railways, &c.—Researches on the production of electro-chemical deposits of aluminium, magnesium, cadmium, bismuth, antimony, and palladium, by M. Bertrand.—On a new dynamo-magnetic phenomenon, by MM. Tréve and Durassier. A horseshoe magnet of any length is covered on one face with a varnish, or, better, a plate of glass. A cylinder of soft iron is laid on its neutral part. It commences to move towards the poles, and reaches them in a time which is naturally a function of the weight of the cylinder and of the coercitive force of the magnet. Thus the magnetic attraction is exerted over the whole extent of the magnet. A new mode is afforded of estimating the magnetic force by the mechanical work which it has effected. The product of the movable weight by the space traversed, divided by the time, will be the rigorous measure of this force. Determining the force, e.g., for three large and three small magnets, identical in form and weight, containing respectively 0·250, 0·500, and 1 per cent. of carbon, the authors think it perhaps possible to define the unit of magnetic force, or *magnétie*, and to establish its equivalence in kilogrammetres. The phenomenon also helps them to determine the magnetic conductivity of steels in relation to their proportions of carbon.—Examination of wine for fuchsine, by M. Bouilhon. He employs hydrate of baryta in excess. It decomposes perfectly the salts of rosaniline, precipitates the colouring matter of the wine, and furnishes, by filtration, liquids of ambreous colour, which do not give persistent emulsions with ether.—Contributions to the anatomy and histology of the Echinida, by M. Fredericq. The nerves and muscles are described. The latter are formed of very thin cylindrical fibres, quite smooth and homogeneous throughout their length. Using various reagents, he could not detect the least trace of transversal striation. The fibres have a fibrillar structure, often with elongated nuclei applied on their surface, but they are without an enveloping membrane. They are birefringent, and are strongly impregnated with colouring matter and osmic acid. The muscles contract strongly under electric excitation, but not so suddenly as striated muscles.—Observation of a bolide, on the night of November 5, 1876, by M. Meunier. A fire-ball, the size of one's fist, was observed near a of Ursa Major; and behind, its trajectory south to north was traceable as a luminous line, commencing near Capella. The flash was bluish, and appeared brighter than moonlight.

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